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UNITED STATES
ATOMIC ENERGY COMMISSION
WASHINGTON, D.C. 20545

This document consists of 4 pages No. 30 of 125 Copies, Series A

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July 27, 1970

CLASSIFICATION BULLETIN WNP-35

LASERS AND THEIR APPLICATIONS

This bulletin supersedes Classification Bulletin WNP-28.

1. Lasers which are capable of power outputs of 10^5 joules or more in ten nanoseconds or less. SECRET

2. Studies on new laser design concepts which demonstrate feasibility of outputs of 10^5 joules or more in ten nanoseconds or less. SECRET

3. Laser experiments or experimental plans that utilize external inertial confinement or external inertial compression of plasma. SECRET- RD

   NOTE: Inertial means that the pressure required to compress or confine is derived from the acceleration or deceleration of condensed matter. However, heating all or part of an isolated homogeneous mass by a focused energy source may not be classified. (See 4)

   Compression or confinement of plasma solely by means of electromagnetic fields is unclassified. Information on plasma confinement by neutral gases is unclassified. Confinement by unheated fuel itself is not external inertial confinement, and may not be classified. (See 4)

4. a. Theoretical calculations or experiments aimed at achieving a pure fusion nuclear explosion. SECRET-RD

   b. Theoretical calculations or experiments involving the use of laser radiation to implode materials to high compression, using spherical or cylindrical convergence. SECRET- RD

Department of Energy Declassification Review

RESTRICTED DATA
This document contains restricted data as defined in the Atomic Energy Act of 1954. Its transmittal or the disclosure of its contents in any manner to an unauthorized person is prohibited.

Group 1
Excluded from automatic downgrading and declassification

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c. Theoretical calculations or experiments producing a density in hydrogen or its isotopes of 1 gram atom or more, per cubic centimeter, or a pulse of thermonuclear yield having a peak specific power output greater than 10^{14} watts per ~~gram~~ cubic centimeter of reacting material. SECRET-RD

NOTE: Reacting material means that portion of material that has a significant burn efficiency, e.g., greater than 10 percent of the peak burn efficiency. It is not intended to apply to a steady burn.

d. Calculations or experiments that do not produce a specific power output greater than 10^{14} watts per ~~gram~~ cubic centimeter only because they involve a relatively inert mixture of hydrogen isotopes (e.g., D-D) but would produce greater than 10^{14} watts per ~~gram~~ cubic centimeter if D-T were substituted. SECRET-RD

5. Deleted

6.

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7. Information confirming the feasibility of pure fusion weapons or devices. SECRET-RD

8. For theoretical calculations or experiments directed at investigating or developing a laser driven nuclear explosion:

a. Parameters of the laser or its operation that reveal classified information about the nuclear system.
CLASSIFIED ACCORDING TO THE CLASSIFICATION OF THE INFORMATION THAT WOULD BE REVEALED

b. Time-shaping of the laser output for purposes of time-shaping the external pressures on the nuclear capsule in order to produce a more efficient implosion. Specifically, a pressure that is initially low, but which rises with time roughly matching the internal pressures in the imploding capsule, and which terminates with a final pressure pulse that provides the main heating of the capsule. SECRET-RD

9. Arrangements or designs for producing a symmetric implosion of material (spherical or cylindrical convergence) by its irradiation from only one side.
SECRET-RD

Desired Protection

The above guidance attempts to provide a safe, quantitative boundary between conditions involved in a thermonuclear explosion and conditions that exist in various forms of controlled thermonuclear burn or that might be achieved in an unfeasible design of a thermonuclear explosive. However, unsuccessful attempts at thermonuclear explosive design may still involve some valid concepts of thermonuclear weapon design or concepts likely to lead to successful laser/pellet explosive designs. Therefore it may be helpful to list what concepts appear to warrant protection. Most are already specified in the weapons classification guide, but may be overlooked in the context of micro-explosion capsules.

The following appear to be areas of laser/pellet technology that require classification protection:

1. Designs of apparatus capable of producing a nuclear explosion (including micro-explosions of pellets). Design concepts that could lead to such capability.

2. Concepts and designs reducing the input energy required to achieve a nuclear explosion.

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Examples of the above requiring classification:

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d. Capsule implosion--using an implosion to create high temperatures and densities in thermonuclear fuel.

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h. Radiation channel around a capsule, dense inertial wall outside the channel.

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C. L. Marshall, Director
Division of Classification